annual reports in organic synthesis–1983

edited by Martin J. O'Donnell and Louis Weiss

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PREFACE

One of the most difficult problems facing chemists today is that of "keeping up with the literature." For several reasons, the problem is particularly severe for the synthetic organic chemist. Bits of information of potential use are scattered throughout common chemistry journals and can be found in any paper, not just those dealing strictly with synthesis. Thus, synthetic chemists must read a large number of journals and must organize and index what they read to make the information available for future reference. All synthetic chemists do this; but the task is becoming more difficult each year as the flow of information increases.

The problem, however, is shared to some extent by all. Most organic chemists are at some time faced with the problem of synthesizing a desired material, and for many the problems are formidable. Nonspecialists faced with the synthetic problem are not likely to have kept pace with the developments in synthetic chemistry that may well solve their problems, and they will not have the necessary information in their files.

Thus, we felt that an organized annual review of synthetically useful information would prove beneficial to nearly all organic chemists, both specialist and nonspecialist in synthesis. It should help relieve some of the information-storage burden of the specialist and should enable the nonspecialist who is seeking help with a specific problem to become rapidly aware of recent synthetic advances. Ideally also, it should appear as promptly as possible after the close of the abstracting period. This year we have placed particular emphasis on keeping the abstracts as concise as possible, while indicating the generality of the reactions involved. We have tried to combine similar publications into inclusive abstracts, particularly in Chapter I. This practice has allowed us to include a larger number of references without a substantial increase in the book's length.

In producing *Annual Reports in Organic Synthesis—1983,* we have abstracted 47 primary chemistry journals, selecting useful synthetic advances. We have tried to present the information in an organized manner, emphasizing rapid visual retrieval. Only the common journals received by our libraries have been abstracted. Any journal received after March 1, 1984 will be covered in the next volume. We have also exercised selectivity in choosing which papers to abstract. Our general guidelines have been to include all reactions and methods that are new, synthetically useful, and reasonably general. Each entry is comprised primarily of structures, accompanied by very few comments. The purpose of this emphasis is to aid the reader in scanning the book. The mind is capable of absorbing a whole picture in an instant, but is considerably slowed by having to read sentences. If the pictures presented catch the reader's interest, he or she should then seek details from the original paper.

For the eighth year we have included a principal author index to aid the user. No subject index is included because to do so would greatly increase both the cost of the book and the lead time for publication. Instead, we have chosen to use an extensive table of contents. Chapters I–III are organized by reaction type and constitute a major part of the book. The organization of these sections is self-explanatory; thus, there should be no difficulty in locating a new method of oxidation or a new cyclo-propanation procedure. Chapter IV deals with methods of synthesizing heterocyclic systems and Chapter V covers the use of new protecting groups. Chapter VI is divided into three main parts and covers those synthetically useful transformations that do not fit easily into the first three chapters. The first part deals only with functional group synthesis; the second covers ring expansion and contraction; and the third involves useful multistep sequences, the individual steps of which may be well known. Future volumes of this series will maintain the present table of contents as much as possible. If no entry is found for a particular section, the last volume in which one appears will be cited in the table of contents.

Any undertaking of this type involves a series of compromises. We have chosen to emphasize reasonable cost, rapid publication, and rapid visual retrieval of information at the admitted expense of detail and beauty.

The arduous task of drawing the multitude of structures appearing in this review was carried out by Ms. Katy Krupa and Ms. Carol P. Bertram. We thank them very much for their efforts. We also thank William Bennett, Tonette Tucker, and Carol P. Bertram for aid in proofreading the manuscript.

MARTIN J. O'DONNELL
LOUIS WEISS

JOURNALS ABSTRACTED

Accounts of Chemical Research
Acta Chemica Scandinavica
Aldrichimica Acta
Angewandte Chemie International Edition in English
Australian Journal of Chemistry
Bulletin of the Chemical Society of Japan
Bulletin de Sociétés Chimiques Belges
Bulletin de la Société Chimique de France
Canadian Journal of Chemistry
Chemical Communications
Chemical and Pharmaceutical Bulletin
Chemical Reviews
Chemical Society Reviews
Chemische Berichte
Chemistry and Industry
Chemistry Letters
Collection of Czechoslovakian Chemical Communications
Comptes Rendus Hebdomadaires de Seances de l'Academie des Sciences (C)
Gazzetta Chimica Italiana
Helvetica Chimica Acta
Indian Journal of Chemistry
Journal of the American Chemical Society
Journal of Chemical Research
Journal of the Chemical Society (Perkin I)
Journal of the Chemical Society (Perkin II)
Journal of General Chemistry (USSR)
Journal of Heterocyclic Chemistry
Journal of Medicinal Chemistry
Journal of Organic Chemistry
Journal of Organic Chemistry (USSR)
Journal of Organometallic Chemistry
Journal für Praktische Chemie
Liebig's Annalen der Chemie
Monatschefte für Chemie
Nouveau Journal de Chimie
Organic Preparations and Procedures International
Organic Syntheses
Organometallics
Pure and Applied Chemistry
Recueil des Travaux Chimiques des Pays-bas
Russian Chemical Reviews
Synthesis
Synthetic Communications
Tetrahedron
Tetrahedron Letters
Topics in Current Chemistry
Zeitschrift für Chemie

GLOSSARY OF ABBREVIATIONS

Ac acetyl
AIBN azobisisobutyronitrile
Ar aryl
9-BBN 9-borabicyclo[3.3.1]nonane
BOC (*t*-Boc) *t*-butyloxycarbonyl
Bu butyl
Bz benzyl
Cbz benzyloxycarbonyl
COD 1,5-cyclooctadiene
Cp cyclopentadienyl
CSA camphorsulfonic acid
DABCO 1,4-diazabicyclo[2.2.2]octane
DBN 1,5-diazabicyclo[4.3.0]non-3-ene
DBU 1,5-diazabicyclo[5.4.0]undec-5-ene
DCC dicyclohexylcarbodiimide
DDQ 2,3-dichloro-5,6-dicyanobenzoquinone
de diasteriomeric excess
DEAD diethyl azodicarboxylate
DIBAH (DIBAL) diisobutylaluminum hydride
DMAD dimethyl acetylenedicarboxylate
DMAP 4-*N*,*N*-dimethylaminopyridine
DME 1,2-dimethoxyethane
DMF dimethylformamide
DMSO dimethyl sulfoxide
E+ general electrophile
ee enantiomeric excess
Et ethyl
Fp η^5-$C_5H_5Fe(CO)_2$
Hex hexyl
HMPA, HMPT hexamethyl phosphoramide (hexamethylphosphoric triamide)
hν irradiation with light
KAPA potassium 3-aminopropylamide
L triphenylphosphine ligand
LAH lithium aluminum hydride
LDA lithium diisopropylamide
LICA lithium isopropylcyclohexylamide
LTA lead tetraacetate
MCPBA *meta*-chloroperbenzoic acid
Me methyl
MEM β-methoxyethoxymethyl
MOM methoxymethyl
Ms methanesulfonyl
MSA methanesulfonic acid
MTM methylthiomethyl
NBS *N*-bromosuccinimide
NCS *N*-chlorosuccinimide
NIS *N*-iodosuccinimide
Ni(R) Raney Nickel
[O] general oxidation
Ⓟ polymeric backbone
PCC pyridinium chlorochromate
PDC pyridinium dichromate
Ph phenyl
(Phen) 1,10-phenanthroline
Phth phthaloyl
PPA polyphosphoric acid
PPE polyphosphate ester
Pr propyl
Py, pyr pyridine
PTC phase-transfer catalysis
Q^+ quaternary ammonium
RT room temperature
TBDMS *t*-butyldimethylsilyl
TCNQ 7,7,8,8-tetracyanoquinodimethane
Tf trifluoromethane sulfonate
TFA trifluoroacetic acid
TFAA trifluoroacetic anhydride
THF tetrahydrofuran
THP tetrahydropyranyl
TMEDA tetramethylethylenediamine
TMP 2,2,6,6-tetramethylpiperidine
TMS trimethylsilyl
Tol tolyl
Tr trityl
Ts, Tos *p*-toluenesulfonyl
TSA toluenesulfonic acid
Z benzyloxycarbonyl; also used for electron-withdrawing groups such as -CN, -COOR, etc.
Δ heat
ϕ phenyl
18-C-6 18-crown-6

CONTENTS

I

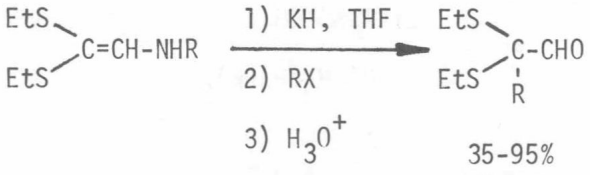
CARBON–CARBON BOND FORMING REACTIONS

I.A. Carbon-Carbon Single Bonds

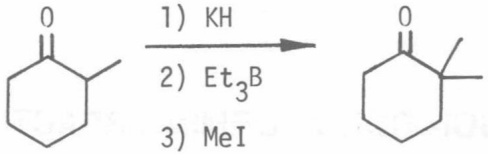
(see also: I.E, I.F, I.G).

I.A.1. Alkylations of Aldehydes, Ketones and Their Derivatives

I.A.1-1 G. S. Bates and S. Ramaswamy, Can. J. Chem., 61, 2006, 2466 (1983); S. M. Makin et al., J. Org. Chem. (USSR), 19, 1044 (1983).



I.A.1-2 E. I. Negishi and S. Chatterjee, Tetrahedron Lett., 24, 1341 (1983); M. A. Krafft and R. A. Holton, ibid, 24, 1345 (1983); J. d'Angelo and G. Revial, ibid, 24, 2103 (1983); E. I. Negishi et al., J. Org. Chem., 48, 2427 (1983).

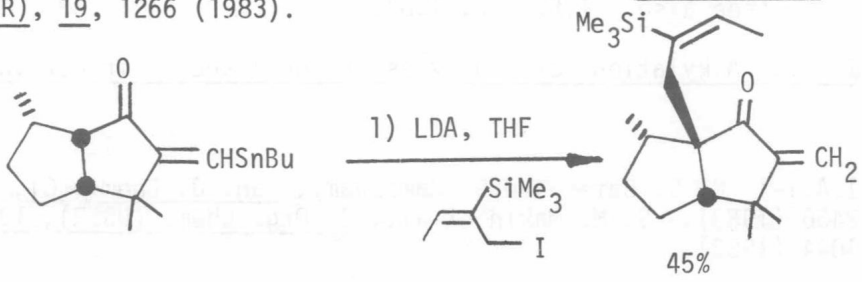


79%

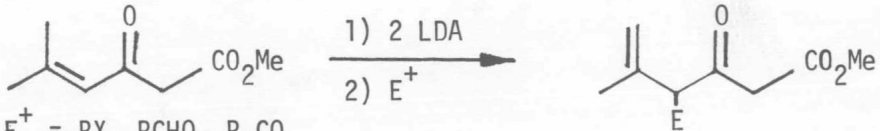
(90% 2,2-)

Highly regiosel. generation of "thermodynamic" enolates.

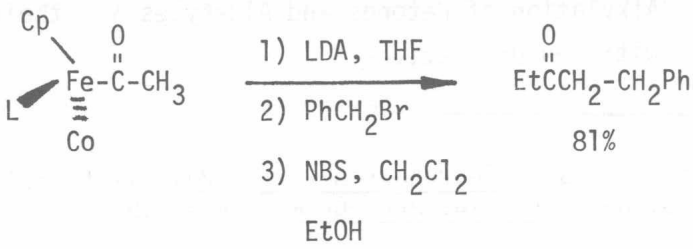
I.A.1-3 L. A. Paquette et al., J. Am. Chem. Soc., 105, 6975, 7352, 7358 (1983); J. Org. Chem., 48, 3282 (1983); A. G. Schultz and J. P. Dittami, ibid, 48, 2318 (1983); L. M. Jackman and B. C. Lange, ibid, 48, 4789 (1983); D. Gravel, R. Deziel and L. Bordeleau, Tetrahedron Lett., 24, 699 (1983); E. V. Vasil'eva, E. M. Auvinen and I. A. Favorskaya, J. Org. Chem. (USSR), 19, 1266 (1983).



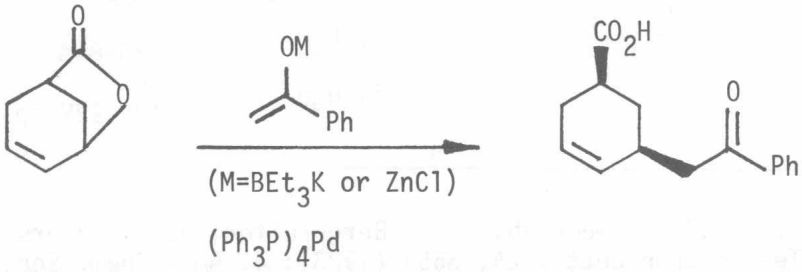
I.A.1-4 J. A. M. van den Goorbergh and A. van der Gen, Rec. Trav. Chim., 102, 393 (1983); P. M. Booth, C. M. J. Fox and S. V. Ley, Tetrahedron Lett., 24, 5143 (1983); G. B. Trimitsis et al., J. Org. Chem., 48, 2957 (1983).



I.A.1-5 L. S. Liebeskind and M. E. Welker, Organometallics, 2, 194 (1983).

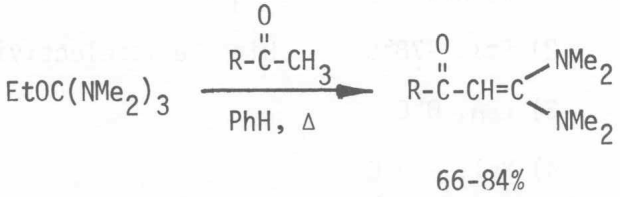


I.A.1-6 E. I. Negishi and R. A. John, J. Org. Chem., 48, 4098 (1983).



Also, study of countercation effects in Pd-catalyzed alkylation.

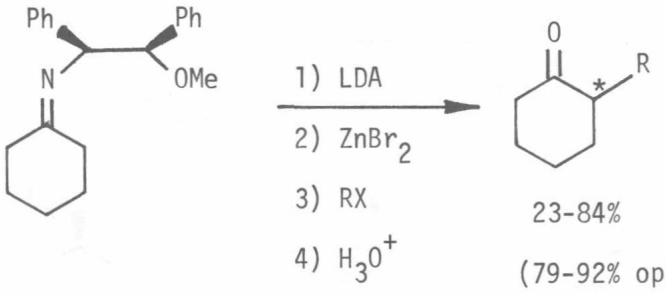
I.A.1-7 W. Kantlehner, W. M. Mergen and E. Haug, Liebigs Ann. Chem., 290 (1983).



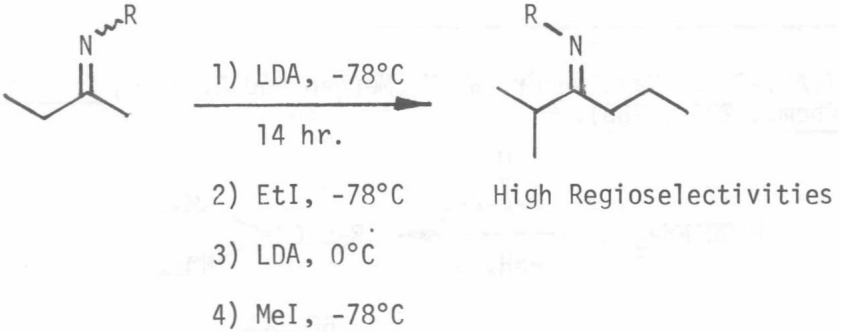
I.A.1-8 J. K. Whitesell and M. A. Whitesell, Synthesis, 517 (1983).

Review: "Alkylation of Ketones and Aldehydes via their Nitrogen Derivatives."

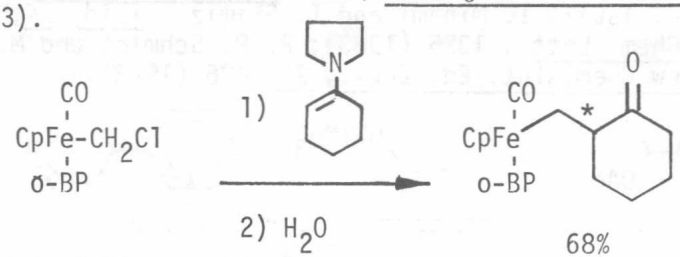
I.A.1-9 K. Saigo et al., Tetrahedron Lett., 24, 511 (1983); D. Enders and U. Baus, Liebigs Ann. Chem., 1439 (1983).



I.A.1-10 M. Newcomb, D. E. Bergbreiter, A. I. Meyers et al., Tetrahedron Lett., 24, 3559 (1983); J. Am . Chem. Soc., 105, 4396 (1983); J. F. Honek, M. L. Mancini and B. Belleau, Tetrahedron Lett., 24, 257 (1983).



I.A.1-11 T. C. Flood et al., J. Organometal. Chem., 244, 61 (1983).



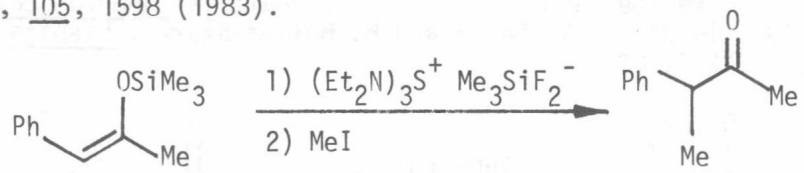
68%

Chiral Electrophile

(60% ee)

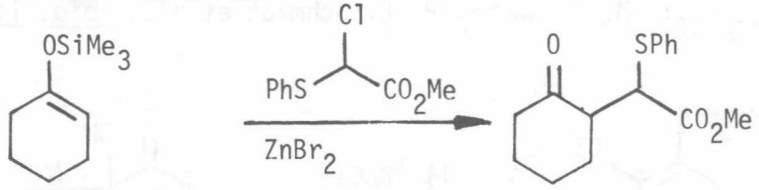
o-BP = tri(o-biphenyl)phosphite

I.A.1-12 R. Noyori, I. Nishida and J. Sakata, J. Am. Chem. Soc., 105, 1598 (1983).



Also, erythro selective aldol.

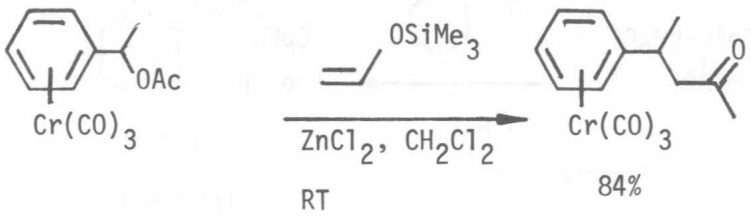
I.A.1-13 T. V. Lee and J. O. Okonkwo, Tetrahedron Lett., 24, 323 (1983); I. Fleming and J. Iqbal, ibid, 24, 327, 2913 (1983); D. J. Ager, ibid, 24, 419 (1983); M. A. Ibragimov and W. A. Smit, ibid, 24, 961 (1983); L. Duhamel, J. Chauvin and C. Goument, ibid, 24, 2095 (1983).



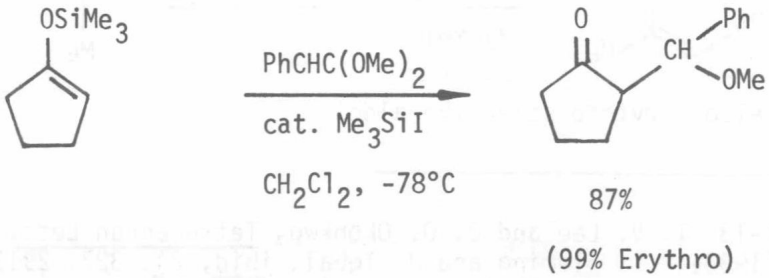
75%

Products transformed to γ-ketoesters or unsaturated γ-ketoesters.

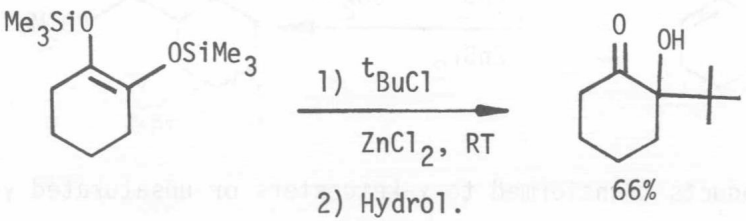
I.A.1-14 M. T. Reetz and M. Sauerwald, Tetrahedron Lett., 24, 2837 (1983); J. Tsuji, I. Minami and I. Shimizu, ibid, 24, 4713 (1983); Chem. Lett., 1325 (1983); R. R. Schmidt and M. Hoffmann, Angew Chem.,Int. Ed. Engl., 22, 406 (1983).



I.A.1-15 H. Sakurai, K. Sasaki and A. Hosomi, Bull. Chem. Soc. Jpn., 56, 3195 (1983); I. Kuwajima et al., Chem. Commun., 796 (1983); D. Kellner and H. J. E. Loewenthal, Tetrahedron Lett., 24, 3397 (1983); M. T. Reetz and H. Muller-Starke, Liebigs Ann. Chem., 1726 (1983).



I.A.1-16 M. T. Reetz and H. Heimbach, Helv. Chim. Acta, 66, 3702 (1983); M. T. Reetz, R. E. Schmidt et al., ibid, 116, 3708 (1983).



Also, t-butylation of carboxylic acid and carboxylic ester derivatives.